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WARZYN

PROJECT
10010201

ECOLOGICAL ASSESSMENT
PRELIMINARY SCREENING REPORT

H.O.D. LANDFILL
ANTIOCH, ILLINOIS

OCTOBER 1993

PREPARED FOR:
WASTE MANAGEMENT OF ILLINOIS INC.
WESTCHESTER, ILLINOIS

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10010201

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INTRODUCTION/SCOPE

This document has been prepared in accordance with Section 4.4.3 Task 3: Site Investigation, Ecological Evaluation of the approved Work Plan for the Remedial Investigation/Feasibility Study (RI/FS) at the H.O.D. Landfill Site (site). The purpose of this Preliminary Screening Report is to determine whether additional site investigation work must be conducted to evaluate if any ecological concerns are present and are related to any site contamination. This document is not the complete ecological assessment that will be submitted as a part of the RI. Rather, it is a streamlined initial assessment of the condition of the habitats surrounding the site as they relate to potential contaminant sources at the site. If ecological impacts due to the site contamination appear reasonably probable based on this preliminary assessment, then additional sampling and/or analysis may be necessary as a part of the RI. This document is intended to provide U.S. EPA Region V with the information necessary to determine whether any further sampling and/or analysis will be needed as a part of the RI.

This preliminary ecological assessment is composed of a description of the local ecological habitats surrounding the site based on site observations, a review of the contaminant concentrations in the potentially affected media, and a qualitative assessment of whether the chemical concentrations detected within habitats pose a ecological health concern. This assessment was performed in accordance with the following U.S. EPA guidance documents:

- Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual, EPA/540/1-89/001 (RAGS Vol. II)

- Regional Guidance for Conducting Ecological Assessments, U.S. EPA Region V (undated)

And other key references:

- Ecological Assessment of Hazardous Waste Sites: Field and Laboratory Reference, EPA/600/3-89/013
- "Eco Updates" which are a series of intermittent bulletins put out by the U.S. EPA's Office of Emergency and Remedial Response, Hazardous Site Evaluation Division

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SITE CHARACTERIZATION

This section provides a general description of the site and the habitats located on and surrounding the site.

2.1 GENERAL DESCRIPTION OF THE SITE AND THE SURROUNDING AREA

The following subsection provides a general description of the site setting and environment, based on information contained in the site Work Plan (Warzyn 1992). Refer to the Work Plan for more detailed information on the landfill history and previous site investigations.

2.1.1 Site Description

The site consists of a total 80 acres, 51 acres of which have been landfilled. Although the landfilled area is visually continuous, it consists of two separate landfill areas, identified as the old and the new landfills. The old landfill consists of 24.2 acres situated on the western third of the property. The new landfill consists of 26.8 acres situated immediately east of the old landfill. The old landfill began operations in 1963 with the disposal of residential garbage and industrial wastes in trenches excavated into the native site materials.

Operation of the new landfill began with the installation of a clay barrier wall between the old and new portions of the landfill. At that time, the installation of a leachate collection system, both along the eastern boundary of the old landfill and within the new landfill was also completed. An allowance for flood storage along the southern extent of the new landfill was also constructed at this time. Where materials other than clayey soils were encountered in the bottom or walls of the new landfill, they were removed and replaced with a minimum of 6 ft and as much as 12 ft of compacted clay.

2.1.2 Site Location/Surrounding Land Use

The site is located within the eastern boundary of the Village of Antioch in Lake County in northeastern Illinois (Township 46 North, Range 10 East, Sections 8 and 9). The site location is shown on Figure 1.

The area south of the landfill and adjacent to Sequoit Creek is classified as a wetland by the U.S. Department of Interior Fish and Wildlife Service and the Illinois Department of Conservation. This classification is based upon stereoscopic analysis of high altitude aerial photographs because this wetland area has not been extensively field examined by these agencies. Identified wetlands around the site are shown on Drawing 10010201-F8. South of this wetland area are commercial developments. These developments have been increasingly encroaching on these wetlands in a northerly direction.

East of the site is the Silver Lake residential subdivision and Silver Lake. Potable water is provided to the subdivision by private water supply wells completed in the deep sand and gravel aquifer. Household wastewater is discharged to septic systems.

Agricultural land, scattered residential areas, and undeveloped land are located to the north of the site. The undeveloped land north of the northeast section of the new landfill is owned by WMII and was used as a borrow area for the landfilling operations.

West of the site is the Sequoit Acres Industrial Park, which is a light industrial area that has been in operation since at least the 1950s. The industrial park was constructed over an old municipal garbage dump and an old industrial dump that was operated by Quaker Industries.

2.1.3 Area Climate

The site is located within a continental climatic belt characterized by frequent variations in temperature, humidity, and wind direction. The average daily minimum temperature is 15°F in January and the average daily maximum temperature is 83°F in July. The average annual precipitation is 32.5 in. The wettest months are April through September (USDA, 1970).

2.1.4 Physiography

The site is situated in the vicinity of the Wheaton moraine within the Great Lakes section of the Central Lowland Province. The topography of the area is generally characterized by gentle slopes with poorly defined surface drainage patterns, depressions, and wetlands. The maximum relief in Lake County is 340 ft.

The topography in the vicinity of the site is generally flat. The most prominent topographic feature in the area is the landfill. The maximum elevation of the landfill is approximately 800 ft mean sea level (MSL). The elevation of Sequoit Creek is approximately 762 ft MSL. Maximum ground surface relief at the site is approximately 40 ft.

2.1.5 Hydrology

Surface drainage around the site is generally toward the Fox River, located approximately 5 mi to the west. Locally, surface water flows from the site toward Sequoit Creek.

Sequoit Creek originally flowed northwest from Silver Lake to a point that is now the approximate center and northern boundary of the site, where it then flowed west toward the Village of Antioch. However, Sequoit Creek was rerouted to flow west from Silver Lake along what is currently the southern boundary of the site sometime between 1964 and 1967. At the southwestern corner of the landfill, the creek was routed to flow north along the western boundary of the site. Approximately 250 ft north of the northwestern corner of the site, the creek flows toward the west approximately 2 mi before discharging into Lake Marie. Lake Marie eventually discharges to the Fox River. Based on aerial photographs and a 1960 USGS topographic map of the site area, the eastern portion of the site was shown as a wetland prior to landfill development.

2.1.6 Surface Soils

The following surface soil types were present at the site prior to site development, and may still be present in undeveloped areas.

- Houghton muck, wet
- Morley silt loam
- Zurich silt loam
- Peotone silty clay loam
- Peotone silty clay loam, wet
- Mundelein silt loam
- Miami silt loam

The Houghton muck and Peotone silty clay loam are classified by the USDA Soil Conservation Service (SCS) as hydric soils. The Zurich silt loam and Mundelein silt loam are non-hydric soils that may contain hydric inclusions.

2.1.7 Site Hydrogeology

Three main hydrogeologic units underlie the site: the surficial sand, the clay diamict, and the deep sand and gravel. The following discussion focuses on the surficial sand, since the deeper units (the clay diamict and the deep sand and gravel aquifer) are not hydraulically connected to Sequoit Creek.

The surficial sand is present along the southern site boundary and exhibits an elongated east-northeast/west-southwest trending geometry. Groundwater flow in the sand is generally from the perimeter of the surficial sand deposit toward Sequoit Creek (Drawing 10010201-F6). Groundwater flow direction in the surficial sand is influenced by Sequoit Creek which traverses the southern and western boundaries of the site. It has been determined that the shallow groundwater from this surficial sand discharges to Sequoit Creek during most periods of the year.

2.2 HABITAT DESCRIPTION

A classification of the habitats present on or near the site was made based on field observations made on July 21, 1993 by a Warzyn Environmental Biologist and Toxicologist, and was also based on his review of aerial photographs of the site and on the National Wetlands Inventory Map for the site area. Refer to Drawing 10010201-F8 for the habitats located on and surrounding the site. The classification of habitats was based on the methods presented in *Field and Laboratory Methods for General Ecology* by Brower and Zar (1977).

The following is a summary of the terrestrial and aquatic habitats that were detected on or near the site, along with the common names of the dominant plant species or groups of species (e.g., goldenrod) within each habitat:

- Deciduous Forest - oak, cottonwood. willows, Honey Locust

- Woodland - cottonwood, Boxelder. grassland species (see below)

- Field/Grassland - assorted tall grass species. Queen Anne's Lace, sweet clover, goldenrod

- Wetlands

  - Wet/Sedge Meadow - Assorted grass species. Common Reed Grass. Green Bullrush, Reed Canary Grass, Queen Anne's Lace. sweet clover

  - Shallow Marsh - Common Reed Grass, cattail

  - Shrub-Carrs - Sandbar Willow. buckthorn, honeysuckle, Red-osier. Dogwood

- Intermittent Pond/Surface Water Storage Area - not observed

- Creek - Elodea, Coontail, species of pond weed, duck weed

Refer to Appendix A for the field notes taken during the July 21, 1993 site visit, which describe in more detail the habitats on and surrounding the site.

In addition to the habitat assessment, the Illinois Department of Conservation (IDC) was contacted to determine if there were any known occurrences of endangered or threatened species, or natural areas on or near the site. Based on IDC's review of the Natural Heritage Database, there are no known occurrences of endangered or threatened species, Illinois Natural Inventory sites, or dedicated Nature Preserves within the vicinity of the site. Refer to Appendix B for a copy of the letter sent by Warzyn to IDC, and the letter report received from IDC by Warzyn.

The United States Fish and Wildlife Service (U.S. F&WS) was also contacted to determine whether there are any known occurrences of federally endangered or threatened species, or natural areas on or near the site. Based on the U.S. F&WS review of the information provided, they do not believe that any federally endangered or threatened species or critical habitats exist on or near the site. Refer to Appendix B for a copy of the letter sent by Warzyn to the U.S. F&WS and the letter report received from U.S. F&WS by Warzyn.

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CONTAMINANT FATE AND TRANSPORT/HAZARD EVALUATION

Within this section, the main routes of potential contaminant transport are summarized along with the present condition of the potentially affected habitats. This section combines both the discussion of the potential for chemical transport by specific migration pathways with the discussion of the apparent effect that the chemical contamination has had on the habitats which are potentially exposed. In this way, the assessment is more streamlined and focused, than if the assessment of chemical migration and risk had been segregated and discussed individually.

3.1 POTENTIAL MIGRATION PATHWAYS

Based on the results of previous site investigations, results from the RI investigation, and the July 21, 1993 site visit, the following are the primary potential pathways of chemical transport from the landfill to potentially sensitive habitats.

- Landfill gas emissions through the landfill cover
- Leachate seepage through the landfill cover
- Surface water runoff from the landfill cover
- Groundwater flow and discharge to Sequoit Creek

The following is a discussion of whether each migration pathway poses a potential ecological concern at the site. This analysis includes, a summary of the chemical characterization of applicable media, a discussion of the potentially impacted habitats, and the visible health of these habitats. In addition, a comparison to applicable or relevant and appropriate requirements (ARARs), and ecological indicators is provided when available for a particular medium.

3.2 LANDFILL GAS EMISSIONS

The following section describes the chemical characteristics of the landfill gas, its potential transport to habitats on or off-site, and any visible impacts that the landfill gas may have had on those on- or off-site habitats.

3.2.1 Fate and Transport of Landfill Gas

The landfill is composed of two main fill areas. The older fill area does not appear to be producing landfill gas based on the monitoring results collected to date as part of the Remedial Investigation (RI). The newer fill area is producing landfill gas which contains a number of VOCs (refer to Table 1). Refer to Drawing 10010201-F2 for the locations of the leachate piezometers where landfill gas samples were collected.

Although a passive landfill gas collection/flare system has been installed within the new landfill, landfill gas has been observed bubbling through saturated soils on the southern side of the landfill cover (i.e., at the location of soil sample SU2). Apparently, the passive gas collection system is not completely controlling the positive gas pressures being developed within the waste, and gas is migrating through certain areas of the landfill cover. On the day of the site visit, no landfill gas was observed bubbling from the landfill, but the smell of landfill gas was apparent while on the landfill. Based on the shallow water table surrounding the landfill, the granular nature of surficial soils in the landfill vicinity, and the gas collection/flare system which is already in place, it is unlikely that landfill gas will migrate substantially away from the limits of fill. This conclusion is confirmed by the sampling results from the three gas probes located just north, east, and south of the new landfill which indicate that landfill gas is not migrating away from the limits of fill. Therefore, exposure of organisms to landfill gas would primarily occur on the new landfill area, since the concentration of VOC contaminated gas emissions would quickly be diluted downwind of the new landfill area.

3.2.2 Hazard Evaluation

Currently, landfill gas not captured by the collection/flare system is likely being released directly through the landfill cover. For this reason, the plant and animals living within the landfill's field and grassland habitat would be the most likely receptors potentially exposed/affected by emissions of landfill gas. The primary route of exposure to mammalian species would be inhalation, while plants would be exposed when gases enter their stomata. Based on the chemical properties of the VOCs contained in the landfill gas (i.e., high volatility, relatively low octanol-water partition coefficient [K_{ow}]), they would not be expected to bioaccumulate in either animal or plant species at the site. For this reason, there should not be a substantial transfer of these contaminants into or through the food chain.

At the time of the site visit, the landfill was covered with dense grassy vegetation except in isolated areas where erosion of the side slopes had occurred, where landfill gas had been observed bubbling through the landfill cover (i.e., location of soil sample SU2), or where soils had been compacted by vehicular traffic. Except at the location of SU2, there were no areas observed on the landfill that were devoid of vegetation which seem to be associated with landfill gas emissions. The majority of the landfill cover is composed of a diverse community of plant species. In addition, a variety of avian and mammalian species utilize the field/grassland habitat for forage and cover.

Based on the observed healthy state of the habitats that are most likely exposed to landfill gas, and the fact that subsurface landfill gas is not migrating away from the fill area, it is unlikely that this migration pathway is posing or will pose a concern to animal or plant populations on the landfill, or adjacent to the landfill.

3.3 LEACHATE SEEPAGE/ SURFACE RUNOFF

The following section describes the chemical characteristics of the areas affected by leachate seepage, as well as the potential transport of this leachate seepage to on- or off-site habitats.

3.3.1 Fate and Transport of Leachate Seepage

As leachate flows overland, it has the potential to contaminate surficial soils. In addition, if there is sufficient flow from the seep, the leachate could provide a source of drinking water for site animals. Leachate seeps have been observed along the slopes of the new landfill, but not along the slopes of the old landfill. Based on field observations, the majority of these leachate seeps flow intermittently. It is possible that their intermittent flow coincides with the occurrences of major (e.g., 1/2 in. or greater) rain events. All of the seep areas observed appeared to be moist or dry on the day of the site visit, except one. A single leachate seep on the southern slope of the new landfill flows on a more regular basis from a gravel filled trench in this location. The gravel trench functions as a conduit for surface water runoff received from the central area of the new landfill via a culvert placed under the landfill access road. The leachate seep flows part way through a transitional habitat zone (i.e., from upland grassland, to a wet meadow, and finally to a shallow wetland). On the day of the site visit, the leachate seep appeared to be flowing into the wet meadow towards the shallow marsh to the south. The leachate seep channel became indiscernible within the wet meadow, as it fanned through the dense grasses. The leachate seep did not appear to flow into the shallow marsh, but there is the potential that during heavy rain events, landfill surface water runoff may carry this leachate seepage into the marsh.

Analytical results for the landfill leachate indicate that it is contaminated with a number of organic and inorganic contaminants. Refer to Tables 2, 3, and 4 for the results of the leachate analysis, and Drawing 10010201-F2 for the locations of the leachate samples.

As part of the RI, surface soil samples were collected in areas where leachate seeps had been observed flowing from the new landfill. These areas include all three exposed sides of the new landfill. The results of the organic and inorganic analyses of the surface soil samples are summarized in Tables 2, 3, and 4. Refer to Drawing 10010201-F2 for the locations of the surface soil samples. The results of the chemical analyses of these surface soil samples showed generally low concentrations of organic contaminants (i.e., mid-ppb to low ppm range) in the surface soils of the new landfill. The two primary contaminants which may have been detected in site soils were methylene chloride and bis(2-ethylhexyl)phthalate. However, these contaminants are both common laboratory contaminants and they are more likely due to that source of contamination of the samples.[1] Low-level concentrations of other VOCs and polycyclic aromatic hydrocarbons (PAHs) were also detected in site soils. Metals concentrations within each of the soil samples were within the common range of background metals concentrations for uncontaminated soil within the United States (U.S.G.S. 1984). These contaminants detected in the site soils would not be expected to bioconcentrate in the plant and animal species of the site. The VOCs are highly volatile and are relatively easily metabolized. In addition, the phthalate and PAHs can normally be metabolized effectively by the mixed function oxidase (MFO) enzyme system of most animals. For this reason, these soil contaminants should not be effectively transferred into or through the food chain.

Based on the low-level concentrations of organic and inorganic contaminants in the site surface soils affected by leachate seeps, it is unlikely that these affected areas would represent substantial source areas for the contamination of other habitats located off the landfill areas (e.g., wetlands, woodlands). This has not

1. The source of the bis(2-ethylhexyl)phthalate in the soil samples is not likely to be the site leachate, since this compound was not detected in the landfill leachate. In addition, the concentration of methylene chloride is quite low in landfill leachate, and therefore, it is also unlikely that the landfill leachate is the source of methylene chloride in the surface soil samples. It is likely that bis(2-ethylhexyl)phthalate and methylene chloride were field or laboratory contaminants. This cannot be confirmed however, because soil field blanks are not collected as part of standard soil sampling methods.

been verified at this time because the preliminary soil sampling effort focused on the origins of leachate seeps.

3.3.2 Hazard Evaluation

Qualitatively, the concentrations of organic contaminants at the origin of the leachate seeps should not pose a health concern to plant and animal species. This statement is based on Warzyn's experience at other similar sites where quantitative assessments have been performed. The concentration of soil contaminants are low, even at the origin of each leachate seep, and the areas affected by the leachate seeps make up only a very small part of the site. The remainder of the site is covered with clean topsoil that does not appear to have been exposed to leachate seepage. Based on Warzyn's field observations, the vegetation within the primary leachate seep area adjacent to the gravel trench appeared to be healthy, although the vegetation in the saturated stream of the seep, which was approximately 1 ft wide, grew less densely. However, the vegetation may have grown less dense only because the soils were saturated with water. The grasses adjacent the seep appeared to be a darker green in color than the grasses further from the seep. This variation in color is possibly due to the increased availability of moisture and/or nutrients from the leachate seep.

Within the transitional zone of the landfill area from upland to wet meadow, it was observed that deer use the grasses to bed down, and a number of bird species were also observed. As mentioned above, the vegetation in the area affected by the leachate seep appeared healthy. However, to prevent future confusion, it should be noted that at the southern edge of the wet meadow near the leachate seep, there is an area where the density of the vegetation is very low compared to other areas near the seep. At the time of the site visit, it did not appear that the leachate seepage could flow into this area. Based on field observations by Warzyn's soil scientist, who was on-site during the day of the site visit, the soil in this area appeared to have been compacted more than the surrounding areas and was also rockier than the surrounding soils that were densely vegetated. For these reasons, it is likely that the lower density of vegetation in this area is due soil conditions and is not related to the leachate seepage.

Most of the other seep areas that were located were observed to be well vegetated with grasses and herbs, except where the soils had been eroded away by the intermittent flow of the seep itself. An example of this erosion was observed on the northern slope of the new landfill. Based on the field observations on the day of the site visit, there were no apparent effects due to leachate seepage on the field/grassland habitats of the landfill area. The affected areas are all located on the landfill cover and do not extend into the wetland, woodland, or grassland/field habitats adjacent to the landfill. However, based on the proximity of these leachate seeps to these habitats, it is likely that when the leachate seeps do flow, some seepage flows away from the landfill into these habitats. Based on the chemical results of the soil samples collected at the origin of the seeps however, the levels of the contaminants detected were low, and this indicates that the seeps are not likely to be substantial source areas for chemical contamination of the habitats off of the landfill.

In summary, on the day of the site visit, no apparent changes to the vegetation were observed which would indicate there had been adverse impacts to habitats located off of the landfill. As part of the remediation of the site, leachate collection may be enhanced to eliminate these leachate seeps. In addition, seep affected areas may be excavated and re-capped. For these reasons, it does not appear likely that leachate seepage is posing or will pose an ecological health concern in the future for the site.

3.4 DISCHARGE OF GROUNDWATER TO SEQUOIT CREEK

The following section describes the chemical characteristics of the groundwater, and the potential impact than the discharge of contaminated groundwater could potentially have on the Sequoit Creek ecosystem.

3.4.1 Transport and Release of Contaminated Groundwater

Based on the RI groundwater monitoring results, contaminated groundwater exists on-site. The shallow groundwater (i.e., within the surficial sand) has the potential of being a source of chemical contamination to Sequoit Creek, because there is a hydrological connection between the surficial sand and the Creek.

The only organic contaminants detected in the shallow site groundwater were trichloroethene, 1,2-dichloroethene, vinyl chloride, and carbon disulfide. The concentrations of these volatile contaminants were very low (i.e., less than 50 ug/L). Refer to Tables 2 and 3 for a summary of the organic contaminant concentrations detected in the site groundwater by location. In addition to the organic contaminants detected in the shallow site groundwater, arsenic, barium, calcium, magnesium, potassium, and zinc were determined to be elevated above area background groundwater concentrations. Refer to Table 4 for a summary of the metal groundwater concentrations by well.

Water level elevations from the water table wells and standpipes screened in the surficial sand indicate that the water table is near the surface and that the groundwater in the surficial sand is flowing in an east to west direction under a shallow hydraulic gradient. Groundwater flow in the surficial sand also has a component of flow discharging into Sequoit Creek (Drawing 10010201-F6), the rate of which is controlled by the hydraulic gradient and hydraulic conductivity of the surficial sand.

The results of the single well hydraulic conductivity slug tests performed in the surficial sand in wells (W3SB, W4S, W5S, US1S, US3S, US4S, and US6S) indicate that the horizontal hydraulic conductivity of the surficial sand ranges from 2.10E-02 to 3.60E-04 centimeters per second (cm/S). These results indicate that groundwater flow can readily take place in the surficial sand deposits and are typical for these types of soil materials.

Based on the water level elevations obtained from well nest W3SA and W3SB, a very slight downgradient vertical hydraulic gradient of 0.002 feet per foot was observed from the water table surface to the base of the surficial sand. This indicates that even though most of the groundwater movement in the surficial sand is horizontally into Sequoit Creek, that there is slight downward groundwater flow.

The only VOCs detected in surface water of Sequoit Creek were 4-methyl-2-pentanone (2 ug/L), and 2-hexanone (3 ug/L). These chemicals were detected in a single sample (i.e., S301), but were not detected in the duplicate water sample. Both of these VOCs were not detected in groundwater on-site, and therefore, their presence is not likely to be related to the site.

Metals concentrations at the downstream Sequoit Creek sampling points (S201 and S301) were comparable to upstream (S101) metals concentrations, except for antimony, lead, and iron. Antimony and lead were detected in one of the two duplicate samples collected at the most downstream location (S301). These two metals were not detected in the on-site groundwater. For these reasons, the single detects of lead and antimony in one of two duplicate samples appear to be unrelated to the site. Iron concentrations were substantially elevated in the two downstream surface water samples compared to the upstream surface water sample. The groundwater on-site contained more iron than the off-site groundwater. No information is available on the site area's groundwater background iron concentration. The elevated surface water iron concentrations that were detected may be associated with the discharge of groundwater originating from beneath the wetlands or the landfill. Groundwater beneath the landfill or the wetlands may have a high dissolved iron concentrations due to the reducing conditions that occur in wetland and landfill environments. Reducing conditions solubilize naturally occurring iron from soils. The wetlands appear to discharge surface water to Sequoit Creek as it flows past the southern side of the landfill. In fact, at surface soil sample SU3 which was collected at the edge of the wetlands adjacent to Sequoit Creek and near the old landfill, it was observed that the soils had a red/orange tint. Such a soil coloration usually indicates a location were water containing dissolved iron has been released. The discharge of groundwater containing elevated iron concentrations to Sequoit Creek at this location may be associated with a combined effect that the landfill and wetlands environments may have on iron solubility.

In summary, except for the elevated concentration of iron in downstream surface water, no other chemicals appear to have been released into Sequoit Creek due to the discharge of groundwater from the surficial sand layer. The release of iron may be associated in part with the reducing environments in both the landfill, and the wetlands south of the landfill.

3.4.2 Hazard Evaluation

Based on a comparison of the organic and inorganic chemical concentrations with the Ambient Water Quality Criteria (AWQC), it does not appear that the health of the Sequoit Creek environment should be endangered by releases of groundwater from the surficial sand layer to Sequoit Creek. All of the chemical concentrations detected were below their respective AWQC with the exception of cadmium which marginally exceeded its criterion in a single sample. However, cadmium was only detected in the upstream sample, and therefore, cannot be associated with the landfill. Although the downstream surface water concentrations of iron were found to be elevated in the surface water (318-424 ug/l), these concentrations are well below iron's AWQC (1,000 ug/l).

During the site visit, the health of Sequoit Creek was observed to determine whether there were any apparent signs of degradation of the stream environment. The aquatic vegetation appeared to be healthy and included a dominant plant species, elodea, which is known to be an indicator of good water quality. Other dominant plant species include coontail (ceratophyllum demersum L.), a species of narrow leafed pond weed (Potamogaton), and curled pond weed (Potamogaton crispus). Along the edges of the creek channel, where the velocity of the water was very low, a species of duckweed also grew. A less prevalent species of aquatic vegetation growing in Sequoit Creek was a species of filamentous algae.

A qualitative survey of benthic invertebrates was also conducted to determine the relative health of Sequoit Creek. Within the Creek, the dominant species of macroinvertebrates were a single species of Amphipoda (Family Asellidae), and Isopoda (Family Gammeridae). In the shadier areas of Sequoit Creek (along the west side of the landfill), these species were found to be very abundant, while in the very sunny locations of the Creek which were sampled these species were not very abundant, or not observed at all. This is consistent with the ecology of these species. As noted in Pennak (1978), these species do not frequent sunny areas, and therefore are typically found hiding under aquatic vegetation and in shady reaches of streams during the day. These species may accumulate in areas were the water velocity changes from swift to slow moving. The highest density of these species was found along the west side of the landfill which has a slower water velocity, which is also shaded by a dense canopy of deciduous vegetation. Amphipods and isopods are indicators of good water quality and are not found in polluted waters. In addition to these two dominant species, a single mayfly nymph (Stenonema sp.) was collected from one of the two vegetation samples collected during the site visit. Larger numbers of mayfly nymphs may have been present in Sequoit Creek earlier in July, since hatches of these nymphs usually occur in late June or early July. Mayfly nymphs are an indicator of good water quality. Other species of macroinvertebrates were found rarely. These included blood worms (Family Chironomidae) and water boatmen (Family Notonectidae). These species of macroinvertebrates can be found in water of poorer quality, but exist in high quality waters also.

Many fish species were observed in Sequoit Creek, although none were collected for identification. Within the Creek, minnows (Family Cyprinidae) were observed, as well as fish which looked similar in size and shape to sunfish or bass (Family Centrarchidea). A large carp (Family Cyprinidae) was also observed in the portion of the Creek that flows through the shallow cattail marsh south of the landfill.

In summary, based on the chemical results of the surface water in comparison to health based surface water standards (i.e., AWQC), and on field observations, the Sequoit Creek environment appears to be healthy.

3.5 SUMMARY

Current potential migration pathways have not been observed to result in impacts of concern to terrestrial or aquatic habitats on or near the site. With the exception of small areas of the landfill cover which have been eroded, the vegetation on the landfill appears to be healthy. The vegetation does not appear to be adversely affected by gas migration through the cover or by leachate seepage. In addition, habitats which occur outside the limits of fill, which may have been exposed to leachate seepage, were not observed to be adversely affected. The terrestrial habitats on and off of the landfill were observed to be the home to wide variety of avian and mammalian species. The Sequoit Creek aquatic ecosystem was also observed to be healthy, and the discharge of shallow groundwater to the Creek is not expected to pose an ecological health concern. The plant and animal communities within Sequoit Creek were observed to be healthy and the dominant species of plants and animals are indicative of good water quality.

4

CONCLUSION

A site field investigation was conducted on July 21, 1993, and a review of pertinent RI chemical and physical data was performed to determine the primary contaminant migration pathways. The primary contaminant migration pathways on-site were determined to be:

- Landfill gas emissions through the landfill cover
- Leachate seepage through the landfill cover
- Surface water runoff from the landfill cover
- Groundwater flow and discharge to Sequoit Creek

One of the primary purposes of the preliminary screening report is to determine if additional data are required to conduct an adequate ecological assessment of the site. The information gathered to assess each of the migrations pathways is generally complete, but for certain migration pathways other data may be beneficial for verifying the importance of these migration pathways. However, although these data may be beneficial, their importance is low, because of the observed health of the habitats. The following is a discussion, by migration pathway, of the completeness of the data collection.

4.1 ASSESSMENT OF AIR IMPACTS

The data collected for the assessment of air impacts to the ecology of the site and surrounding area is considered complete. It is assumed that air dispersion modeling, and a quantitative assessment of air-related health risks to organisms on the landfill, will not be required. Rather, it is considered that the data collected on the observed health of the habitats, and the lack of gas migration off of the landfill, will provide sufficient basis for no further characterization of the air pathway.

4.2 ASSESSMENT OF LEACHATE SEEPAGE/SURFACE WATER RUNOFF

The data collected for the assessment of the impacts of leachate seepage/surface water runoff to habitats on the landfill may be considered to be partially complete. Samples of surface water runoff from the landfill during a rain event have not been collected and analyzed. Also, verification of whether there are chemical impacts to soils off of the landfill due to leachate seepage has not been conducted. Also background soil samples have not been collected. However, based on the low concentrations of contaminants in site soils at the origin of the seeps and, the apparent health of the off-landfill habitats, further soil characterization is not necessary.

4.3 ASSESSMENT OF GROUNDWATER DISCHARGE TO SEQUOIT CREEK

The data collected to assess the impact of groundwater discharge into Sequoit Creek may be considered to be partially complete. Although surface water data was collected from the Creek, such data only provides an indicator of current chemical releases, but not of past chemical releases. Sediment samples would provide a better indicator of past releases of contaminants to the Creek. However, based on the apparent health of the Creek's benthic invertebrate population, further characterization of the Creek environment is not necessary.

4.4 ASSESSMENT OF ECOLOGICAL HEALTH EFFECTS

Another primary purpose of the screening assessment is to determine whether it is possible that ecological health effects are occurring on-site. At this time, there is no apparent need for additional field assessment of the habitats on-site, nor an apparent need to conduct laboratory bioassays on chemically impacted media to further determine the health of the habitats. Based on the preliminary ecological assessment, deleterious health effects to terrestrial or aquatic ecosystems in the site area have not been observed. The landfill's grassland/field habitat appeared to be healthy, except in very isolated areas. As part of the site remedy, the leachate seepage in these isolated areas are likely to be addressed. Therefore, the landfill cover should continue to provide a healthy, established grassland habitat in the future. In addition, the wetland, woodland, forest, and field habitats surrounding the landfill, and the Sequoit Creek ecosystem, were observed to be healthy. The plant and animal life within Sequoit Creek included species that are indicators of good water quality. The only apparent chemical impact to

Sequoit Creek is the likely release of iron to the surface water from the surficial sand groundwater zone. However, the iron concentrations detected are below Ambient Water Quality Criteria developed for the protection of sensitive aquatic species.

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TABLE 4

Summary Of Metals in Groundwater, Surface Water, Surface Soils, and Leachate

H.O.D. Landfill RI/FS

Sample ID	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium, total	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Silver	Sodium	Thallium	Vanadium	Zinc
Leachate																							
HD-LCLP01-01	57,100		31.3	510	4.0	21.3	448,000	126	52.8	207.0		154,000	241	357,000	2,260	0.43	184	283,000	3.0	1,080,000	2.0	114	
HD-LCLP01-91	222,000		32.0	1,710	12.5	67.9	1,410,000	418	185.0	755.0		612,000	884	780,000	9,020	1.8	560	297,000	10.9	1,040,000		386	8,280
HD-LCLP06-01	4,770		30.6	257	1.2	5.8	204,000	42.1	14.3	33.7		24,800	79.8	282,000	816		76.0	507,000		1,140,000		20.3	
HD-LCLP08-01	18,000		39.3	459	1.4	5.6	119,000	68.0	38.9	63.7		43,600	104	211,000	676	1.3	203	495,000		1,530,000	2.2	45.2	
HD-LCLP11-91	65,900		51.3	1,610	4.9	35.4	550,000	174	49.9	378.0	37.8	257,000	1,930	333,000	2,790	1.3	172	82,000	8.2	238,000		105	
HD-LCMHE-01	151		4.1	636			90,300	9.9	8.1	9.4		7,900	6.2	138,000	76.2		21.9	113,000		480,000	2.0	2.4	
HD-LCFB01-03	62.2						6,190			5.2		22.6		32.9	2.7					726			600
Surface Soils																							
HD-SU01-01	7,450		5.2	32.5	0.66		78,500	14.3	8.6	19.6		17,600	12.7	41,000	418		19.2	1,940		524	0.6	18.6	45.3
HD-SU02-01	6,260		1.9	25.1	0.55		88,200	10.4	4.1	17.6		9,160	11.5	31,000	88.6		10.5	1,270		133		15.1	46.2
HD-SU03-01	6,640		4.1	30.7	0.54	1.0	62,900	12.5	6.2	19.0		23,500	12.4	31,500	367		15.2	1,720		155		19.4	48.2
HD-SU04-01	8,740		2.2	50.0	0.50		22,400	15.6	8.6	15.1		17,500	10.5	11,000	502		15.8	1,200		64		26.0	43.9
HD-SU04-91	*8,740*		*3.3*	*57.0*	*0.55*		*21,300*	*15.4*	*13.4*	*15.2*		*18,200*	*13.4*	*11,500*	*984*		*16.1*	*1,230*		*68*		*27.8*	*43.5*
HD-SU05-01	8,450		4.4	40.4	0.74	1.3	79,100	16.1	10.8	25.8		22,100	13.7	40,800	623		23.0	1,760		175	0.8	24.6	74.8
Regional Range	7000->100000	<1-8.8	<0.1-73	10-1500	<1-7		100-280000	1-1000	<0.3-70	<1-700		100->100000	<10-300	50-50000	<2-7000	0.01-3.4	<5-700	50-37000		500-50000	2.2-23	<7-300	<5-2900
Common Range	10000-300000		1-50	100-3000	0.1-40	0.01-0.70	7000-500000	1-1000	1-40	2-100		7000-550000	2-200	600-6000	20-3000	0.01-0.3	5-500	400-30000	0.01-5	750-7500		20-500	10-300

Notes:

1. This table presents all metals detected in samples collected from HOD Landfill during May 1993. Results are in ug/L for groundwater, surface water, and leachate; and mg/kg for soils.
2. MCLs are U.S.EPA Maximum Contaminant Levels for groundwaters. Class I and Class II are IEPA Groundwater Quality Standards. Class I (potable water resource) is applicable to the deep sand and gravel aquifer groundwater, and Class II (general resource groundwaters) is applicable to surficial sand and clay diamict groundwater. Bolded values exceed the MCL.
3. Well G11S was not sampled for metals analysis because sufficient sample volume could not be collected.
4. Background metal concentrations for local soils were unavailable. In order to provide a means of comparing the soil metal concentrations onsite, observed concentration ranges for soils are presented from two sources. The Regional range (i.e., *Eastern United States) were obtained from "Element Concentrations in Soils and other Surficial Materials of the Conterminous United States, U.S. Geological Survey Paper 1270, 1984.* *The common ranges were obtained from Table 1.1 The Content of* Various Elements in the Lithosphere and in Soils, of "Chemical Equilibria in Soils" by Willard L. Lindsay.

Revised 9/17/93
[J:10010201:MTL.XLS/JAH/AJS]

TABLE 1

Summary of Landfill Gas Results

H.O.D. Landfill RI/FS

Compound	Molecular Weight	HD-LGLP01-91	HD-LGLP06-01	HD-LGLP07-01	HD-LGLP08-01	HD-IGLP11-01	HD-IGLP11-91
1,1-Dichloroethane	99		570	2,200			
1,1-Dichloroethene	97			1,900			
1,2,4-Trimethylbenzene	181		3,300	8,900	16,000		3,100
1,3,5-Trimethylbenzene	181		1,500	3,800	6,700		
2-Butanone	72	62	5,300	15,000	65,000		1,800
4-Ethyl toluene	120		2,600	6,400	13,000		2,400
Acetone	58		1,700	9,300	36,000		
Benzene	78	32	1,300	3,100	2,100	2,010	2,200
Carbon disulfide	76		2,100				
Chlorobenzene	113		830		21,000		
Chloroethane	65	120	2,200				
Chloromethane	50				1,500		
cis-1,2-Dichloroethene	97	25	1,500	21,000	5,600	9,500	11,000
Ethylbenzene	106	150	16,000	48,000	42,000	14,000	15,000
Trichlorofluoromethane (Freon 11)	137	440	67,000	1,500		1,700	18,000
Dichlorotetrafluoroethane (Freon 114)	171		50,000		5,300	6,000	6,600
Dichlorodifluoromethane (Freon 12)	121		31,000	8,900	10,000	45,000	43,000
Methylene chloride	85	330	760				1,800
Tetrachloroethene	166		1,800	30,000	5,600	18,000	19,000
Toluene	92	2,000	41,000	250,000	200,000	75,000	79,000
Trichloroethene	131		860	13,000	3,200	5,100	5,400
Vinyl chloride	63		13,000	54,000	33,000	2,800	3,400
Xylenes (total)	106	220	33,000	130,000	100,000	30,000	31,000

Notes:

1. This table presents all volatile compounds detected in landfill gas samples collected from landfill gas wells at HOD Landfill during May 1993.

2. Sample results are in mg/m3. These values were calculated from units of parts per billion, volume to volume (ppb(v/v)), as reported in the complete analytical reports included in the Appendices. The conversion to mg/m3 is as follows:

$$mg/m3 = (ppb(v/v) * MW) / 24.45 \text{ Liters}$$

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TABLE 2

Summary of Volatile Organics Compounds in Groundwater, Surface Water, Surface Soils, and Leachate

H.O. D. Landfill RI/FS

	Alkenes					Alkanes			Ketones					Aromatics					
SAMPLE ID	Tetrachloroethene	Trichloroethene	1,1-Dichloroethene	1,2-Dichloroethene (total)	Vinyl chloride	1,1-Dichloroethane	1,2-Dichloroethane	Chloroethane	1,2-Dichloropropane	4-Methyl-2-pentanone	2-Butanone	2-Hexanone	Acetone	Benzene	Ethylbenzene	Toluene	Xylenes (total)	Carbon disulfide	Methylene chloride
MCL	5	5	7	70	2		5		5					5	700	1000	10000		5
Class I	5	5	7	70	2		5							5	700	1000	10000		
Class II	25	25	35	200	10		25							25	1000	2500	10000		
Groundwater - Shallow On-Site																			
HD-GWG11S-01																		0.8	
HD-GWUS04S-01				35															
HD-GWUS06I-01		2																	
HD-GWUS06S-01																			
HD-GWUS06S-91																			
HD-GWW05S-01					**19**														
HD-GWW06S-01				2															
Groundwater - Shallow Off-Site																			
HD-GWUS01S-01																			
HD-GWUS03I-01																			
HD-GWUS03S-01																			
HD-GWW03SB-01																			
HD-GWW04S-01																			
HD-GWW04S-91																			
Groundwater - Deep On-Site																			
HD-GWG11D-01																			
HD-GWUS04D-01																			
HD-GWUS04D-91																			
HD-GWUS06D-01																			
HD-GWW07D-01																			
Groundwater - Deep Off-Site																			
HD-GWUS01D-01																			
HD-GWUS03D-01				11	**28**														
HD-GWW03D-01																			
Surface Water																			
HD-SWS101-01																			
HD-SWS201-01																			
HD-SWS301-01										2		3							
HD-SWS301-91																			
Surface Soils																			
HD-SU01-01													140	7	240	55	280		570
HD-SU02-01													17		12	3	37	6	59
HD-SU03-01													8						48
HD-SU04-01																			1,200
HD-SU04-91													15			2			210
HD-SU05-01																			
Leachate																			
HD-LCLP01-01	9			7				45		22	190	14	110	12	52	330	100		160
HD-LCLP01-91								46		22				13	46	450	90		180
HD-LCLP06-01										160	3,200		2,200			210	170		58
HD-LCLP08-01										450	12,000		19,000			260			
HD-LCLP11-01				190							3,900		1,500		130	740	330		
HD-LCMHE-01	9	14	5	70	18	13	22		28	43	120		140	22		62	41		44

Notes

1 This table presents volatile organic compounds detected in samples collected during May 1993

2 Results are in parts per billion (ppb): ug/L for groundwaters, surface waters, and leachates, and ug/kg for soils

3 MCLs are U.S. EPA Maximum Contaminant Limits for groundwater. Class I and Class II are IEPA Groundwater Quality Standards. Class I (potable resource) applies to deep sand and gravel aquifer groundwater. Class II (general resource) applies to surficial sand and clay diamict groundwater. *Bolded groundwater results exceed the MCL.*

Revised 9/16/93

[J:10010201:VOC.XLS/JAH/AJS]

TABLE 3
Summary of Semivolatile Organic Compounds in Groundwater, Surface Water, Surface Soils, and Leachate
H.O.D. Landfill RI/FS

	Phenols				Phthalates		Polynuclear Aromatic Hydrocarbons												Pest/PCBs	
SAMPLE ID	Phenol	2,4-Dimethylphenol	2-Methylphenol	4-Methylphenol	Diethylphthalate	bis(2-ethylhexyl)phthalate	Acenaphthene	Anthracene	Benzo(b)fluoranthene	Carbazole	Dibenzofuran	Fluoranthene	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	1,4-Dichlorobenzene	4,4'-DDD	Aroclor-1016
MCL						4			0.2									75		0.5
Class I	100																	75		5.0
Class II	100																	375		2.5
Groundwater - Shallow On-Site																				
HD-GWG11S-01																				
HD-GWUS04S-01																				
HD-GWUS06I-01																				
HD-GWUS06S-01																				
HD-GWUS06S-91																				
HD-GWW05S-01																				
HD-GWW06S-01																				
Groundwater - Deep On-Site																				
HD-GWG11D-01																				
HD-GWUS04D-01																				
HD-GWUS04D-91																				
HD-GWUS06D-01																				
HD-GWW07D-01																				
Groundwater - Shallow Off-Site																				
HD-GWUS01S-01																				
HD-GWUS03I-01																				
HD-GWUS03S-01																				
HD-GWW03SB-01																				
HD-GWW04S-01																				
HD-GWW04S-91																				
Groundwater - Deep Off-Site																				
HD-GWUS01D-01																				
HD-GWUS03D-01																				
HD-GWW03D-01																				
Surface Soils																				
HD-SU01-01						160	120	46		130	59	110	68	61	320	250	77	130	4.3	
HD-SU02-01						320	1,000				620		500	390	630	240				
HD-SU03-01						280			110			160				120	110			
HD-SU04-01						3,500						59				36	52			
HD-SU04-91						3,600														
HD-SU05-01						9,600						73				51	54			
Surface Water																				
HD-SWS101-01																				
HD-SWS201-01																				
HD-SWS301-01																				
HD-SWS301-91																				
Leachate																				
HD-LCLP01-01	160	12		730	32															4.6
HD-LCLP01-91	170	11		760	31										34					6.3
HD-LCLP06-01	83	4	16	1,300											6			5		
HD-LCLP08-01	840	20		2,200											26					
HD-LCLP11-01	5	3		48	4	42									16			20		
HD-LCMHE-01	19	6		5																

Notes:

1. This table presents semivolatile organic compounds detected in samples collected from HOD Landfill during May 1993.
2. Results are in parts per billion (ppb): ug/L for groundwaters, surface waters, and leachates, and ug/kg for soils.
3. MCLs are U.S. EPA Maximum Contaminant Levels for groudwaters. Class I and Class II are IEPA Groudwater Quality Standards. Class I (potable water resource) is applicable to the deep sand an gravel aquifer groundwater, and Class II (general resource groundwater) is applicable to the surficial sand and clay diamict groundwater. Bolded values exceed the MCL.

Revised 9/16/93

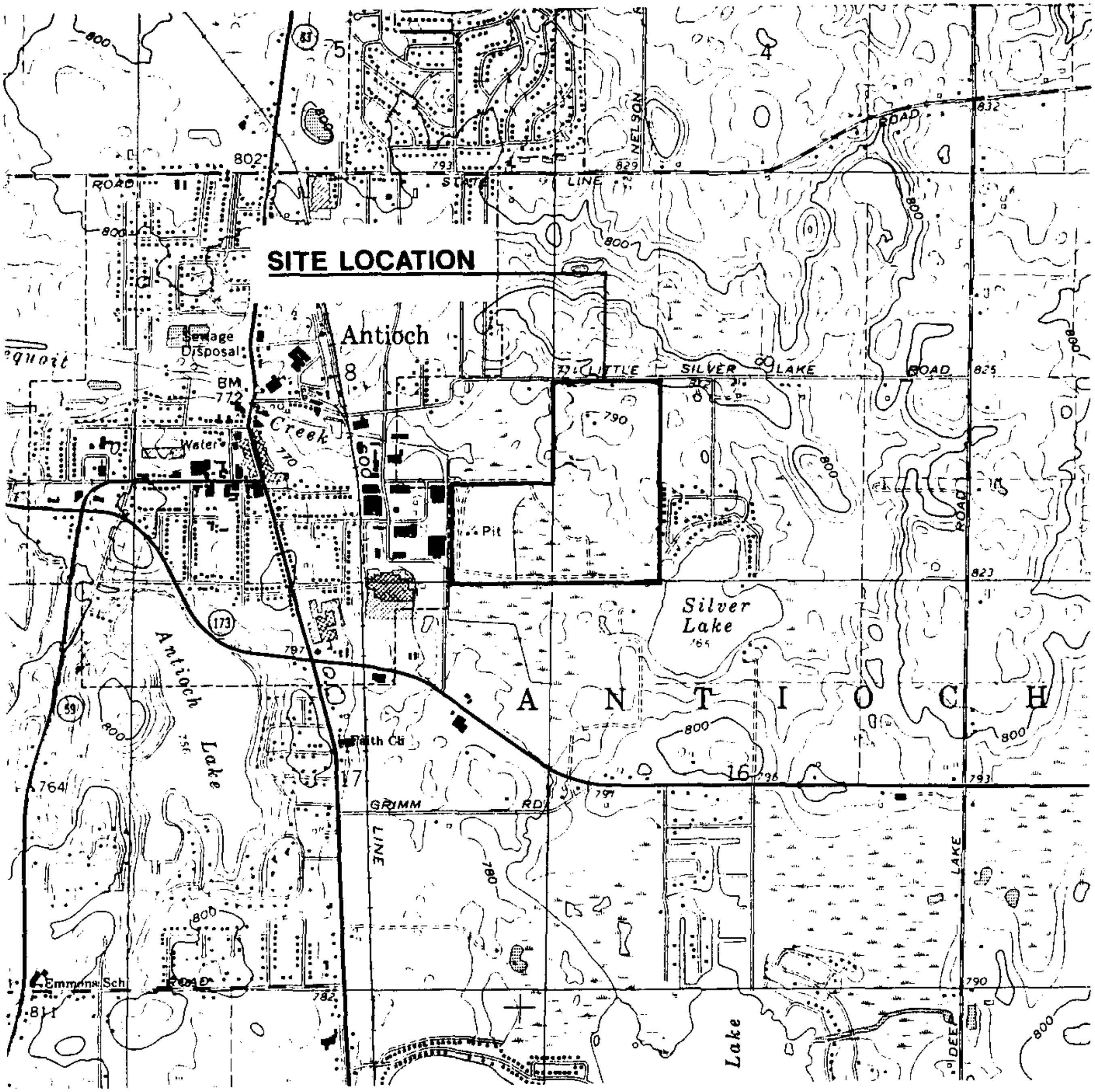
[J:10010201:SVOC.XLS/JAH/AJS]

TABLE 4

Summary Of Metals In Groundwater, Surface Water, Surface Soils, and Leachate

H.O.D. Landfill RI/FS

Sample ID	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium, total	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Silver	Sodium	Thallium	Vanadium	Zinc
MCL	50	5	50	2,000	1	5		100		1,000	200	300	15		50	2	100		100		2		5,000
Class I			50	2,000		5		100	1,000	650	200	5,000	7.5		150	2	100		50				5,000
Class II			200	2,000		50		1,000	1,000	650	600	5,000	100		10,000	10	2,000						10,000
Background Value			6.97	118		2.52	62,200			34.6			20.6	54100		118	50.1	2,920	6.04	69,000			102
Groundwater Shallow On-Site																							
HD-GWUS04S-01				106			119,000					**2,700**		46,700	**72.7**		9.7	1,570		55,800			
HD-GWUS06I-01			9.5	53.6			51,200							43,900	20.3			17,600		33,900			
HD-GWUS06S-01				68.1			105,000					**2,530**		44,800	**87.7**			1,290		17,500			
HD-GWUS06S-91				66.7			105,000					**3,200**		43,400	**84.9**			1,200		16,800			
HD-GWW05S-01				182			148,000					**2,480**		40,200	**692**			4,250		38,900			
HD-GWW06S-01				116			353,000	4.4				**3,600**		126,000	**745**			4,620		24,300			
Groundwater Shallow Off-Site																							
HD-GWUS01S-01				34.9			83,700			4.4		**805**		39,200	261					21,300			
HD-GWUS03I-01			6.3	41.1			45,500							34,000	39.6			1,710		36,200			
HD-GWUS03S-01				55.1			79,800					**1,230**		29,600	**50.1**			2,990		98,500			
HD-GWW03SB-01				95.3			128,000					**1,070**		55,000	**109**		6.0	1,750		64,300			352
HD-GWW04S-01				363			163,000	4.4	9.0			238		42,500	**1,070**		8.4	14,000		50,900			248
HD-GWW04S-91			4.1	354			155,000		4.1			206		42,400	**1,110**			14,100		52,500			333
Groundwater Deep On-Site																							
HD-GWG11D-01			3.1	282		5.6	112,000	3.5						98,600	32.0			3,050		33,700	2.1		
HD-GWUS04D-01				47.6			40,300							26,500	18.0			1,810		50,300			
HD-GWUS04D-91				59.1			43,200					225		25,300	16.0			1,400		38,100			
HD-GWUS06D-01				69.0			48,200					**845**		24,400	31.0			1,820		49,500			
HD-GWW07D-01				73.8			36,500							21,800	**53.4**			1,580		57,300			
Groundwater Deep Off-Site																							
HD-GWUS01D-01				89.8			58,800					**660**		41,700	**58.7**			1,150		25,400			
HD-GWUS03D-01				129			96,500					**2,400**		46,200	42.4			2,580		67,500			474
HD-GWW03D-01				163			115,000	4.3				**707**		62,500	**141**		5.2	2,610		63,200			314
Surface waters																							
HD-SWS101-01	113			19.4		3.3	52,600	3.2		2.3				25,700	50.9			2,210		26,000			
HD-SWS201-01	107			22.2			46,700			2.1		424		24,900	56.8			2,110		34,400			
HD-SWS301-01	55.5			21.9			52,500					318	2.0	25,500	54.2			2,060		35,000			
HD-SWS301-91	91.1	27.6		22.2			52,400					355		25,400	53.7			2,010		34,900			
HD-SWFB01-01							1,260					35.2		25.6									154



NOTES

1. BASE MAP DEVELOPED FROM THE ANTIOCH, ILLINOIS 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP DATED 1960, PHOTOREVISED 1972.

north

0 2000 4000

SCALE IN FEET

FIGURE 1

Developed By: SJC Drawn By: CCM	SITE LOCATION MAP	Drawing Number 10010201 A1
Approved By: Alan J. Kchmidt Date: 10/6/93	REMEDIAL INVESTIGATION H.O.D. LANDFILL WASTE MANAGEMENT OF ILLINOIS, INC. ANTIOCH, ILLINOIS	WARZYN
Reference:		
Revisions:		

QUALITY CONTROL | Graphic Standards CCM 8-5-93 | Lead Professional SJC 9-6-93 | Technical Review AJS 9-21-93 | Project Manager | Management Review | Other

ZYN INC.

A

HABITAT DESCRIPTION

The following are descriptions of the main habitats which were observed on or surrounding the H.O.D. Landfill. Refer to Drawing 10010201-F8 for the location of each of these habitats. These habitat descriptions are based on Warzyn's field observation during the July 21, 1993 site visit. These qualitative habitat descriptions are based on the methods described in Field and Laboratory Methods for General Ecology by Brower and Zar (1977).

Deciduous Forest

Small areas of deciduous forest are located at the eastern edge of the site and are scattered to the north and south of the site. The predominant species of trees within the western area of forest were species of oak and honey locust. Other species observed along the fringe of this forest were smooth sumac, European buckthorn, and honeysuckle. Within the forest areas north and south of the site. eastern cottonwood. and Weeping Willow were the predominant species of trees. Other species of trees and shrubs which were observed in the southern and northern forest areas were European buckthorn, green ash, silver maple, box elder, honeysuckle, smooth sumac, Japanese quince, and elm. The forested areas consisted of a dense canopy of the deciduous tree species with an understory of shrubs. Below the shrub layer, there was a layer of herbs consisting of short grass species and other such species as burdock and black raspberries.

This forested land has the potential of providing habitat for a variety of avian and mammalian species. To the north of the site, within the forest land adjacent to the wetlands, coyotes have been heard howling on a number of occasions. During the site visit, coyotes were heard howling during the afternoon. When the forest was entered, there appeared to be an abandoned den that was located. An active den was not observed within close proximity to the abandoned den.

Woodland

Woodland habitats exist on-site to the south of the landfill area and off-site to the west and north. These woodland areas are composed of low density stands of predominantly eastern cottonwood, although there were also green ash, box elder, and red mulberry trees. Due to the increased light intensity reaching through the tree canopy, there was a more established shrub and herb layer. The herbaceous species were similar to those found in the grassland environment and included Queen Anne's Lace, white and yellow sweet clover, and species of goldenrod. In areas south of the landfill, where the woodland areas are within the wetlands, the predominant vegetation surrounding the cottonwood trees is giant reed canary grass. A variety of avian species were observed in or near these woodland habitats. These included species of sparrows, a robin, an eastern king bird, American gold finches and meadowlarks. Animal tracks in or near the woodland habitats included whitetail deer and raccoon tracks.

Field/Grassland

The landfill areas, and other mechanically disturbed areas on or off-site (e.g., the borrow pit area) have developed into field/grassland habitats. The field/grassland habitat makes up the predominant surface area of the site. This habitat consists of a thick herbaceous layer with few shrubs or trees. The predominant species within this habitat are a variety of tall grass species such as red clover, Queen Anne's Lace, yellow and white sweet clover, and goldenrod. Other plant species which were observed include: blue vervain, Canada thistle, bull thistle, wild bergamot, daisy fleabane, common dandelion, alfalfa, wild strawberry, curled dock, dogbane, chicory, common ragweed, and common cinquefoil. The avian species observed within the grassland/field habitat were generally similar to the woodland habitats. Additional avian species observed within the grassland/field habitat include swallows, swifts, and red-tailed hawks. Evidence of mammalian species were also observed in the grassland/field habitat. On both the south and north slopes of the landfill there is evidence of deer trails, and areas were deer use the tall grasses for cover. A species of mouse or vole was also observed. Tracks of raccoons were evident in wet areas of the grassland/field habitat.

Wetlands

Wetlands are present on-site to the south of the new landfill and off-site to the north and south of the site. There are three types of wetlands which were observed on or surrounding the site. These include wet/sedge meadow, shallow marsh, and shrub-carrs.

The predominant areas of wet/sedge meadow are located directly south of the new landfill, and north of the landfill. The primary species of plants in these areas were assorted grass species such as giant reed grass, green bullrush, reed canary grass, Queen Anne's Lace, and sweet clover. Other species of vegetation include many of the species of grassland/field plants listed previously. Within the wet/sedge meadow to the south of the landfill there was evidence of deer using the tall grasses for cover. Within these areas leopard frogs and crayfish burrows were also observed. The avian species observed were similar to other areas of the site.

To the south of the southern wet/sedge meadow is a shallow marsh. The shallow marsh extends south and ends north of Sequoit Creek. As a part of the design of new landfill, the area between the wet/sedge meadow and Sequoit Creek was designed as a flood storage area. The predominant plant species within the shallow marsh is giant reed canary grass, a species of cattails, and reed canary grass. In addition to this shallow marsh area, the area south of Sequoit Creek is an expansive cattail marsh. This shallow marsh habitat would provide nesting habitat for a variety of avian species including red-winged blackbirds.

Along the fringe of the shallow marsh to the south of the site, especially near the northern bank of Sequoit Creek, and north of the landfill were areas of shrub-carrs habitat. The predominant plant species within the shrub-carrs consisted of sandbar willow, European buckthorn, honeysuckle, and red-osier dogwood. This habitat also contained other plant species previously described as occurring in the woodland and grassland/field habitats. Shrub-carrs provide food and cover for a variety of avian and mammalian species.

Intermittent Pond/Surface Water Storage Area

During the site visit, there was standing water observed in the southeast corner of the site. This area is labeled as an intermittent pond on Drawing 10010201-F8. The pond area, based on observations during varying periods of the year, intermittently retains water. This area was designed, during construction of the new landfill, to act as a surface water storage area for surface runoff from the new landfill. The species of plants which exist in this area are similar to the plant species already described for the wet/sedge meadow and shallow marsh.

Sequoit Creek

Sequoit Creek drains the shallow wetlands located to the south of the Creek. The reach of Sequoit Creek which flows along the southern property boundary of the site has predominantly a cattail marsh habitat abutting both of the banks, and therefore, this reach is relatively unprotected from direct sunshine. Along the northern bank of this reach of the creek there is scattered riparian woodland habitat which consists of mainly weeping willows, elm, green ash, buckthorn, honeysuckle, wild grape, and black raspberry. The Sequoit Creek channel is relatively narrow (i.e., less than 15 ft wide). On the day of the site visit, the Creek channel was only wide and deep enough for a johnboat to pass as far as halfway upstream along this southern reach. Within the channel of Sequoit Creek, the main species of aquatic vegetation were elodea, coontail, species of pond weed, and duck weed. On the day of the site visit, the current was swift within this portion of the Creek. The water velocity appeared to be approximately 3-5 miles per hour. Fish were observed within the channel and appeared to be members of the minnow and bass families. The numbers of benthic invertebrates were generally low in this area of the Creek, probably due to the direct sunlight. The species of benthic invertebrates which were observed in this area included isopoda, amphipoda, water boatmen, and bloodworm.

At the southwestern corner of the property, Sequoit Creek bends sharply and flows to the north under the landfill access road. At this location a great blue heron was observed fishing on the day of the site visit. The creek along this reach is shaded by a relatively dense canopy of weeping willow, and box elder trees. There was an understory of silky dogwood, honey suckle, wild grape, black raspberry, and Virginia creeper. The creek channel became wider in this area and the water velocity was much slower. There are many trees which have fallen into the water and the banks are much steeper when compared to the upstream reach of Sequoit Creek along the southern boundary of the site. A number of animal burrows and tracks were observed along the banks of the creek within this area. Within the shady reach of the creek, species of isopoda and amphipoda were relatively abundant. The predominant aquatic plant species was coontail. Species of turtles, frogs, ducks, and geese were also observed along this reach of Sequoit Creek. Overall, Sequoit Creek appears to provide good habitat for a wide array of both aquatic and terrestrial plants and animals.

MWK/cas/AJS
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[chi 609 64b]
10010201/42225

B

Correspondence Concerning Information on Threatened And Endangered Species

WARZYN

August 11, 1993

Ms. Deanna Glosser, Endangered Species Program Manager
Illinois Department of Conservation
524 S. Second Street
Lincoln Tower Plaza
Springfield, Illinois 62701-1878

Dear Ms. Glosser:

Warzyn is currently performing a Remedial Investigation/Feasibility Study of the H.O.D. Landfill Site, Antioch, Illinois as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). As part of this project, Warzyn is preparing an Ecological Assessment of the site, which includes a review of available information concerning endangered and threatened species.

I would like to obtain any information your office may have concerning the reported or potential presence of Federal or State of Illinois threatened or endangered species for the H.O.D. Landfill Site area. The site is located within the eastern boundary of the Village of Antioch in Lake County in northeastern Illinois (Township 46 North, Range 10 East, Sections 8 and 9). I have enclosed a copy of the appropriate U.S. Geological Survey topographic map with the site marked on it.

Sincerely,

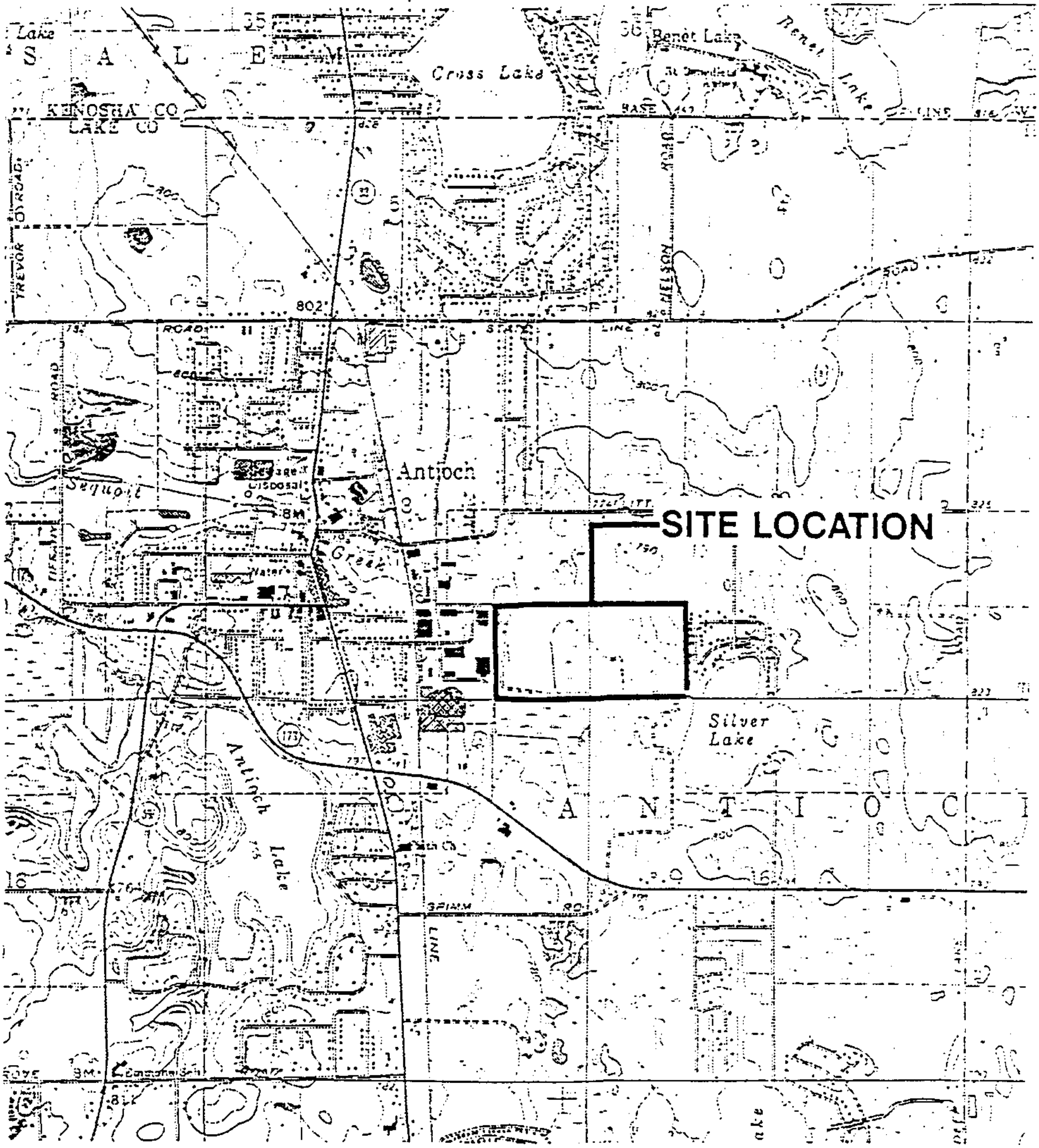
WARZYN INC.

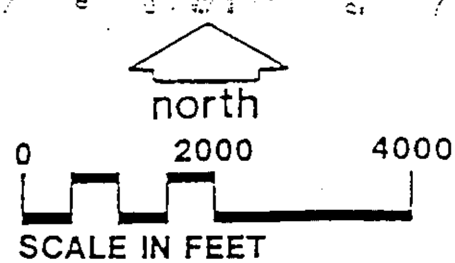
Michael W. Kierski, Ph.D.
Toxicologist

MWK/vlr/AJS
[mad-108-218]
10010201/42250

THE PERFECT BALANCE
BETWEEN TECHNOLOGY
AND CREATIVITY

MADISON
ONE SCIENCE COURT
P.O. BOX 5385
MADISON, WI 53705





NOTES

1. SITE LOCATION MAP DEVELOPED FROM THE ANTIOCH, ILLINOIS 7 1/2 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1960, PHOTOREVISED 1972.

FIGURE 1

WARZYN	SITE LOCATION MAP	Drawn HLH	Checked RJM
	PRELIMINARY SITE EVALUATION REPORT H.O.D. LANDFILL, RI/FS ANTIOCH, ILLINOIS	Revisions	App'd. AJS Date 10/24/90 60953 A1

Illinois Department of Conservation
LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787 CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH • CHICAGO 60601
Brent Manning, Director John W. Comerio, Deputy Director Bruce F. Clay, Assistant Director

AUG 1993

August 23, 1993

Michael Kierski
Warzyn
One Science Court
P.O. Box 5385
Madison, WI 53705

RE: Remedial Investigation/Feasibility Study of the H.O.D. Landfill Site, Antioch, IL

Dear Mr. Kierski:

Thank you for sending the above project to this office for review for the presence of endangered or threatened species or natural areas. The Natural Heritage Database was examined and there are no known occurrences of endangered or threatened species, Illinois Natural Areas Inventory sites, or dedicated Nature Preserves within the vicinity of the project area.

Please be aware that the Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of significant natural features in any part of Illinois. The reports only summarize the existing information regarding the natural features or the locations in question known to the Division of Natural Heritage at the time of the request. The reports should never be regarded as final statements on the site being considered, nor should they be a substitute for field surveys required for environmental assessments.

If you need additional information or have any questions, please do not hesitate to contact me at 217-785-8290.

Sincerely,

Deanna Glosser, Ph.D.
Endangered Species Protection
Program Manager

WARZYN

August 11, 1993

Ms. Emilya Orteon-Palmer
U.S. Fish and Wildlife Service
1000 Hart Road, Suite 180
Barrington, Illinois 60010

Dear Ms. Onteon-Palmer:

Warzyn is currently performing a Remedial Investigation/Feasibility Study of the H.O.D. Landfill Site, Antioch, Illinois as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). As part of this project, Warzyn is preparing an Ecological Assessment of the site, which includes a review of available information concerning endangered and threatened species.

I would like to obtain any information your office may have concerning the reported or potential presence of Federal or State of Illinois threatened or endangered species for the H.O.D. Landfill Site area. This site is located within the eastern boundary of the Village of Antioch in Lake County in northeastern Illinois (Township 46 North, Range 10 East, Sections 8 and 9). I have enclosed a copy of the appropriate U.S. Geological Survey topographic map with the site marked on it.

Sincerely,

WARZYN INC.

Michael W. Kierski

Michael W. Kierski, Ph.D.
Toxicologist

MWK/vlr/AJS
[mad-108-217]
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608/231-4747
FAX 608/231-4777

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chicago Metro Wetlands Office
1000 Hart Road - Suite 180
Barrington, Illinois 60010

708-381-2253

IN REPLY REFER TO:

FWS/AES-CIFO

October 1, 1993

Michael W. Kierski, Ph.D.
Warzyn Inc.
One Science Court
Madison, WI 53705

RE: Remedial Investigation/Feasibility Study, HOD Landfill Site, Antioch, Illinois

Dear Dr. Kierski:

This is in response to your August 11, 1993 request for documentation regarding any federally endangered or threatened species, or critical habitat, in the vicinity of the H.O.D. Landfill Site, Antioch, Lake County, Illinois for the purpose of preparing an Ecological Assessment for a Remedial Investigation/Feasibility Study of the site.

Based on the information provided, we do not believe that any federally endangered or threatened species occur in the vicinity of the landfill. It does not appear that the proposed remedial action is likely to jeopardize the continued existence of any species listed as endangered or threatened, or cause adverse modification of the habitat of such species.

For information concerning the presence of State of Illinois endangered and threatened species, we recommend you contact Deanna Glosser, Ph.D., Endangered Species Program Manager, Division of Natural Heritage, Illinois Department of Conservation, Lincoln Tower Plaza, 524 S. 2nd St., Springfield, IL 62701.

These comments provide technical assistance only and do not fulfill the requirements under Section 7 of the Endangered Species Act of 1973, as amended, unless you have been designated in writing, to the Regional Director of the U.S. Fish and Wildlife Service, Region 3, by the appropriate federal agency, as a non-federal representative for the purposes of conducting informal consultation on the subject federal action, pursuant to 50 CFR 402.08.

If you have any questions regarding the contents of this letter, please contact Amelia Orton-Palmer or Jeff Mengler at 708/381-2253. Please refer any requests for information on the presence of endangered species for future projects directly to me.

Sincerely,

Benjamin N. Tuggle, Ph.D.
Field Supervisor